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Effectiveness of Air Cleaning Systems in Crushing Zones of Dressing Mills

Current level of industrial production is characterized by the large-scale implementation of intensive technological processes incorporating crushing and grinding of minerals. In some cases, finely dispersed state of materials facilitates management of production processes. However, technological operations result in contamination of air and working environment.

It is well known that fine dust formed in the processing and production of a number of mineral substances cause diseases of personnel at mining enterprises.

Numerous comprehensive studies on occupational health of workers at coal and metals processing plants indicate that the safety issues in these sectors are neglected.

In this regard, the most important task in protecting workspaces and the environment is the development of technologies to drastically reduce or completely eliminate pollutant emissions in the technological processes.

Today at concentrating mills of the mining enterprises dry dust collection of heterogeneous flows (two-component systems - solid plus gas) dominate. The use of wet dust collection causes a problem of sludge formation (solids plus water).

Among the variety of these devices vortex cyclones are highly demanded. These devices are characterized by simplicity of design, reliability and high degree of air clearing. In these devices the cleaning process results from successive helical motion from top downward and a sharp change of the flow rate and its direction. As a result solids (dust) are separated from gaseous substance (air).

The degree of purification in cyclone depends on the dispersive composition, density of the dust particles, the flow velocity and the device geometry. It was deduced from experiments that the maximum clearance is achieved if the peripheral speed of polluted stream in the cyclone exceeds velocity of air incoming into the cyclone. Cyclones are most common dust collecting devises. They provide stable air purification from dust particles larger than 10 microns with an efficiency of 80% - 95% at low capital and maintenance costs

In mining industry cyclones are divided into highly efficient and high performance ones. The first type is effective, but expensive in maintenance, High performance cyclones have small hydraulic resistance, but they are less effective in trapping small particles.

Therefore, gas-cleaning devices should be selected taking into account the balance of cleaning performance in specific conditions and control equipment efficiency. This work is carried out at a design stage and allows the company to have an effective dust collecting system for reasonable money.